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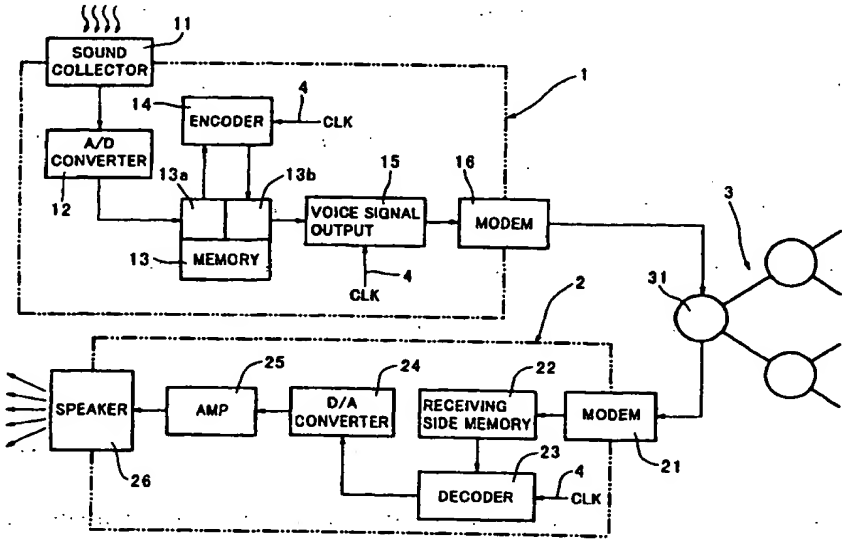

(57) Abstract

There is disclosed a voice data transmission system in which voice data is transmitted via a communication line in the form of data packets, which can reduce problems of interruption of the message transmittal and also of the communication delay. In this system, the data packets from the transmitting side are sent out onto a communication line at predetermined constant time intervals. At the receiving side, the data is retrieved at constant time intervals identical to the aforementioned predetermined constant intervals at which the data packets are sent out from the transmitting side. The data packet size is preferably smaller than that of a conventional system, and the time interval at which the data packet is sent out is preferably smaller corresponding to the data packet size. The preferable interval for sending out the data packets is not larger than approximately 60 ms, more preferably approximately 20 ms.

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SPECIFICATION

SYSTEM TO TRANSMIT VOICE DATA OVER A PACKET NETWORK

BACKGROUND OF THE INVENTION

1. Field of the invention

The present invention relates to a system for transmitting a voice data. In particular, the present invention relates to a voice data transmission system in which voice data is transmitted in the form of data packets via a communication line.

2. Prior Art

Conventionally known voice communication systems include a system wherein liking between terminal equipments such as personal computers each provided with a CPU through a network allows voice data to be mutually transmitted for achieving a conversation with voice. Such a known conversation system using personal computer terminals is advantageous in being available at less expensive cost than a general-purpose phone call system. It can also be used for mutual conversation over an intercommunication line, e.g. LAN.

In this sort of conventional conversation system, it, however, frequently causes problems such that voice is interrupted during conversation and further a noticeable delay is caused in voice transmission. The reasons for these problems can be found in the fundamental construction of this system. In such a communication system, data to be

sent is passed onto a communication line in the form of data packets. The data packet is typically composed of a header portion having an information of an address and a protocol identifier, a data portion containing coded data, and a trailer portion indicating the end of the packet. The size of the data contained in one packet is relatively large, such as, typically, approximately 300ms to 500ms per one packet. Now in a current communication line, e.g. Internet, it is known that a certain ratio of data packets transmitted via the communication line are lost during the communication. Generally, the data packets lost in the communication lines are supposedly not less than 20% of the total. When a communication system using such a communication line is applied to the voice communication purpose, the result caused from the data packets lost during the communication would reach at the level in which a hearer can feel the effect by the ears and this would be recognized as a interruption of voice massages in the conversation, due to the large amount of data contained in each packet.

Further, in the voice communication system using such a communication line, a CPU in a terminal equipment of the system is generally adapted to process not only the voice communication data but also other loaded jobs such as those for transmitting documents, images and the like, and for their appendant, and further, the information to be sent is passed onto the communication line not only under a single protocol but also under various different protocols. In addition, each data packet size contained in the information varies to a large extent, so that there is a high possibility that a large size of data packet is inserted between voice message data packets to interrupt the voice communication. When such

large size other data packet interrupts the voice data packets in the conventional voice communication system, the transmission or receiving of the voice data would be discontinued during the interruption and this results in a time lag of a message transmission in the conversation.

SUMMARY OF THE INVENTION

It is an object of the present invention to solve problems encountered in conventional voice data transmission systems in which voice data is sent out in the form of data packets via a communication line and to provide a voice data transmission system which enables interruption of conversation to be substantially decreased and also time lag of the message transmission in the conversation can be decreased.

According to the present invention, in order to solve the above problems, a packet data from a sending side is sent out onto a communication line at a predetermined constant interval. The communication line may be either of both a wired and wireless type communication line. In a receiving side, the data is retrieved at a constant interval which is identical to the predetermined constant interval at which the data packet is transmitted from the transmitting side. Preferably, the size of the data packet is considerably smaller than that of the conventional system, and the transmission interval of the data packet is accordingly considerably smaller. A preferable transmission interval is not more than approximately 60 ms, more preferably approximately 20 ms.

Thus, the present invention provides a voice data transmission system for transmitting a voice data via a communication line comprising a

transmitting side terminal and a receiving side terminal which are linked together via a wired and/or wireless communication line, wherein the transmitting side terminal includes an encoder for sequentially receiving input data through a sound collector to sequentially generate data packets each including a header portion and a data potion containing, preferably compressed, coded voice signals and a voice signal output portion for sequentially sending out the data packet onto the communication line, the receiving side terminal including a receiving side memory for sequentially storing the data packet received from the communication line, a conversion portion for sequentially retrieving the data packet stored in the receiving side memory to convert the voice signals into analog voice signals by decoding the coded voice signals and a regenerating portion for regenerating voice messages according to the decoded analog voice signals, the voice data transmission system characterized in that the voice signal output portion in the transmitting side terminal is adapted to sequentially send out the data packet onto the communication line at a predetermined constant interval, the conversion portion in the receiving side terminal is adapted to retrieve the received data packet from the receiving side memory at a constant interval which is identical to the predetermined constant interval at which the voice signal sending portion in the transmitting side terminal sends out the data packet. In this case, the predetermined constant interval is preferably not larger than 60 msec, more preferably not larger than 20 msec.

Further, in a preferable embodiment of the present invention, the voice signal output portion in the transmitting side terminal is adapted to sequentially send out the data packet onto the communication line at the

predetermined constant interval by means of a timer control. The conversion portion in the receiving side terminal is also adapted to retrieve the received data packet from the receiving side memory at the aforementioned constant interval by means of a timer control.

In another embodiment of the present invention, the transmitting side terminal further includes a transmitting side memory, wherein the voice data from the sound collector is stored in a first memory area of the transmitting side memory after being converted into digital data by an analog/digital converter, the encoder being adapted to read the digital data stored in the first area and generate a data packet from the digital data without having the digital data read from the first memory area stored in another memory area. In addition, the encoder is adapted to store the compressed coded voice signals in a second memory area of the transmitting side memory, the voice signal output portion being adapted to directly read the coded voice signal stored in the second memory area to sequentially send out the read coded voice signal onto the communication line without storing it into other memory areas.

In another embodiment of the present invention, there is provided a terminal device of a voice data transmission system for transmitting a voice data by being connected to a wired and/or wireless communication line. This terminal device comprises a transmitting portion and a receiving portion, wherein the transmitting portion includes an encoder for sequentially receiving input data through a sound collector to sequentially generate data packets each including a header portion and a data potion containing, preferably compressed, coded voice signals and a voice signal output portion for sequentially sending out the data packet onto the

communication line, the voice signal sending portion being adapted to sequentially send out the data packet onto the communication line at a predetermined constant interval. The receiving portion includes a receiving side memory for storing a data packet received from the communication line and containing the voice data, a conversion portion for sequentially retrieving the data packet stored in the receiving side memory to convert the voice signal into an analog voice signal by decoding the voice signal, and a regenerating portion for regenerating a voice message according to the decoded analog voice signal. The conversion portion is adapted to retrieve the received data packet from the receiving side memory at a constant interval identical to the predetermined constant interval at which the voice signal output portion of the transmitting portion sends the data packet. In this case, the voice signal output portion of the transmitting portion is preferably configured to sequentially send out the data packet onto the communication line at the predetermined constant interval by means of a timer control. Likewise, the conversion portion of the receiving portion is preferably configured to retrieve the received data packet from the receiving side memory at the aforementioned constant interval by means of a timer control.

In a further embodiment of the present invention, there is provided a voice data receiving device. This receiving device comprises a receiving side memory for sequentially storing a data packet which contains a voice data received from a communication line, a conversion portion for sequentially retrieving the data packet stored in the receiving side memory to convert the voice signals into analog voice signals by decoding the voice signals and a regenerating portion for regenerating a voice according

to the decoded analog voice signal. The conversion portion then retrieves the received data packet from the receiving side memory at a predetermined constant interval by means of a timer control.

In still further embodiment of the present invention, there is provided a voice data transmitting device. This transmitting device comprises an analog/digital converter for converting voice data, from a sound collector into digital data, a transmitting side memory for storing the digital data, and an encoder for sequentially retrieving the digital data from the transmitting side memory to sequentially generate data packets each including a header portion and a data potion containing compressed coded voice signals and a voice signal output portion for sequentially sending out the data packets onto the communication line. As a feature of the present invention, the digital data is stored into a first memory area of the transmitting side memory, and the encoder is adapted to directly read the digital data which is stored in this first area to generate a data packet and then stores the data packet containing the compressed coded voice signals into a second memory area. In addition, the voice signal output portion directly reads the data packet stored in the second area to send out the data packet onto the communication line. In this case, the voice signal output portion is preferably configured to send out the packet data onto the communication line at a predetermined constant interval by means of a timer control.

In yet further embodiment, the present invention provides a method for transmitting voice data and a method for receiving voice data and regenerating a corresponding voice message. The method for transmitting voice data in accordance with the present invention comprises steps of

converting analog voice data received from a sound collector into digital data, storing the converted digital data in a memory, retrieving and encoding the digital data stored in the memory, and sending out the encoded data onto a communication line at predetermined constant time intervals. The method for receiving voice data and regenerating a corresponding voice message comprises steps of sequentially storing data packets, each containing voice data and received from a communication line, into a memory, sequentially retrieving the data of the packet which is stored in the memory at a predetermined constant interval by means of a timer control in preference to other processing, and converting the voice signal into an analog voice signal by decoding the voice signal, and regenerating the voice according to the decoded analog voice signal.

According to the aforementioned features of the present invention, the voice data packet from the transmitting side is sent out onto the communication line at a predetermined interval, so that it is possible to prevent problems wherein a processing for signal output is interrupted by another processing for receiving or sending other information and as a consequence a delay is caused in a voice data transmission. Further, the receiving side is adapted to retrieve, the received data packet at a constant interval identical to a predetermined constant interval at which the transmitting side sends out the voice data packet, so that it is possible to solve such problems that in the receiving side, a signal receiving processing is interrupted by another processing for receiving or sending other information and as a consequence a delay is caused in a voice transmission. In addition, since the present each voice data packet is considerably small in size comparing with a data packet in the

conventional system, the possibility of the voice interruption would be significantly lowered due to the fact that the data amount lost at a time becomes smaller even if certain degree of data packets is lost during the communication.

The conventional system includes a configuration in which an analog/digital converter for converting voice data into digital signal has its own memory area, an encoder for compressing/cording the digital signal generated by the analog/digital converter to regenerate voice data packets has its own memory area, and a voice signal output portion for sending out the voice data packet onto a communication line has also its own memory area. Thus, the output of the analog/digital converter is once stored into the memory area belonging to the analog/digital converter, and this stored output of the analog/digital converter is then transferred into the memory area belonging to the encoder to be read from this memory area by the encoder. Then, the output of the encoder is once stored into an output side of the memory area belonging to the encoder, and is then transferred from this memory area into the memory area belonging to the voice signal output portion, and is then read by the voice signal output portion to be sent out onto the communication line.

Thus, in the conventional system, there is an increased number of data transfer between respective memories so that a substantial time is spent for sending out the signal, resulting in delay in the transmission of the voice signal. In contrast to this conventional system, in the present invention, after the voice data from the sound collector is converted into digital data by the analog/digital converter, the digital data is stored in the first memory area of the transmitting side memory, and the digital data

stored in the first area is then directly read by the encoder without having the read digital data stored into other memory areas to generate the data packet from the digital data. Further, the encoder stores the compressed coded voice signals in the second memory area of the transmitting side, and the voice signal output portion directly reads the coded voice signal stored in the second area to sequentially send out the read coded voice signal onto the communication line without having it stored in other memory areas. Therefore, the number of voice data transferring between respective memory area is considerably reduced, so that the time delay in the sending out the voice signal can be shortened.

The present invention further provides a recording medium which records a data of a control program to enable the aforementioned control to be executed by a personal computer. The recording medium according to the present invention, in one embodiment includes a record of at least a part of a program data for controlling a processor of a computer to execute steps, repeatedly at a predetermined constant interval, of reading voice digital data from a memory when there is input voice digital data in the memory, compressing the read voice digital data to form a voice data packet and sending out the voice data packet onto a communication line. Further, a recording medium according to another embodiment of the present invention includes a record of at least a part of a program data for controlling a processor of a computer to execute steps repeatedly of reading a voice data packet from memory at a predetermined constant interval when input of the voice data packet from the communication line exists, and decoding the voice data. Furthermore, a recording medium according to the present invention, in another embodiment, includes a

record of at least a part of a program data for controlling a processor of a computer to make steps, repeatedly at a predetermined constant interval, of reading a voice digital data from a memory when there is an input voice digital data exists in the memory, compressing the read voice digital data to form a voice data packet, and sending out the voice data packet onto a communication line. In the present invention, this program data can be provided to the communication line in the form of a transmitting medium such as a signal which transmits an information containing such data. In this case, the information of the program data may be provided either as a push type in which the information is positively transmitted from an offering party or as a pull type in which an offered party derives the information from a server of the offering party.

Further, the present invention provides a method for providing a signal representing the program described above onto a communication line by having it on a carrier wave.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic block diagram showing one embodiment of a voice data transmission system according to the present invention.

Fig. 2 shows a content of a data packet.

Fig. 3 shows a process from a processing of a voice data to a sending.

Fig. 4 is a timing chart showing comparing a processing according to the present invention with a conventional processing.

Fig. 5 are diagrammatical drawings showing examples of applications of the present invention, wherein Fig.5(a) shows an example where personal computers are linked together and Fig.5(b) shows an example where a personal computer and a typical phone are linked respectively.

Fig. 6 shows flow charts representing a control program incorporated into a CPU when a personal computer is employed as a terminal in an implementation of the present invention, wherein Fig. 6(a) and (b) show a processing flow at a transmitting side and a processing flow at a receiving side respectively.

DETAILED DESCRIPTION OF THE PREFERED EMBODIMENTS

The present invention will now be described with reference to preferred embodiments. In Fig. 1, there is shown a block diagram showing an entire configuration of a voice communication system implementing the present invention. This system comprises a transmitting side terminal 1, a receiving side terminal 2, and a communication line 3 which links both the transmitting side terminal 1 and the receiving side terminal 2. The communication line 3 may be anyone of wired and wireless communication line or their combination. Generally, both the transmitting side terminal 1 and the receiving side terminal 2 are incorporated in a single equipment

such as a personal computer, and they are respectively configured as a transmitting portion and a receiving portion.

The transmitting side terminal includes a sound collector 11, such as a microphone for collecting audible voice. The sound collector 11 functions to generate voice analog signals in response to an audible voice. This voice analog signal is introduced into an analog/digital converter 12. The analog/digital converter 12 functions to convert the input voice analog signal into a digital signal, and its output is connected to a memory 13. An encoder 14 and voice signal output portion 15 are connected to the memory 13. The voice signal output portion 15 is connected to the communication line via a modem 18.

In this embodiment, a voice digital signal, which is an output of the analog/digital converter 12, is stored in a first area 13a of the memory 13. As described in detail thereinafter, the encoder 14 reads the voice digital signals from the first area 13a of the memory 13 at a predetermined constant time interval by a timer control based on a clock signal 4 to execute a desirable processing. The encoder 14 functions to compress and encode the voice digital signals it to form voice data packets. The data packet, as shown in Fig. 2, has a header portion containing an address information and a protocol identifier, a data portion containing information of voice signals to be sent out and a trailer indicating the end of the packet. The voice data packet generated by the encoder 14 is stored in a second memory area 13a of the memory 13.

The voice signal output portion 15 is, as described in detail thereinafter, controlled by the clock signal to directly read a data packet of the compressed and coded voice signals from the second area 13b of the

memory 13, and send them out onto the communication line 3 via the modem 16.

The receiving side terminal 2 is provided with a receiving side memory 22 adapted to receive the voice data packets transmitted from the communication line 3 via a modem 21. A decoder 23 is connected to the receiving side memory 22. The decoder is, as described in detail thereinafter, controlled by the clock signal 4. The decoder 23 reads the voice data packets read from the receiving side memory 22 to regenerate the voice digital data by uncompressing and decoding the voice data packets. The output of the decoder 23 is introduced into a digital/analog converter 24, then the voice digital signal is converted into voice analog signals. The output of the digital/analog converter 24 is amplified by being connected to an amplifier 25 , and is then regenerated as an audible voice by a speaker 26.

The communication line may be configured as a network such as a conventional Internet including a router 31, a server and so on, and a conventional line can be used as it is. As described above, the communication line 3 may include a wireless or radis communication line.

Fig. 3 schematically shows a process for generating voice data packets. A voice analog signal A is sampled each time instant t1, t2...tn which is respectively separated at a predetermined time to generate voice digital signals D1, D2,... Dn.

These voice digital signals are arranged in sets for each of the predetermined intervals T and the voice digital signals in each set are compressed and encoded to be incorporated into the data portion P0 of the voice data packet P. In this embodiment, this predetermined interval T is

set to 20 ms. The voice data packet P generated as described is sent out from the output portion 15 through the modem 16 onto the communication line 3 at a predetermined interval. This sending interval is also set to 20 ms which is identical to the interval at which the voice data packet P is generated. Thus, controlling the transmittal of the voice data packet P by use of a clock signal 4 allows the sending of the voice data packet P to be executed in preference to other processing and to prevent the problem that the sending of the voice data packet is delayed due to the interruption of other processing during a voice communication. In addition, since the voice data contained in one voice data packet P is only 20 ms which is significantly small, even if the data packet is lost during the communication, the effect of the lost data can be low, so that the data loss cannot be felt by human ears. Therefore, the interruption of voice messages can be suppressed.

Fig. 4 is a diagram showing a difference in operation between the case where a voice data packet is transmitted by use of PTR protocol according to the Windows standards and the case where a voice data packet is transmitted according to the embodiment of the present invention. As sown in Fig. 4(a), in the conventional system, prior to transmitting a voice data packet for a voice communication, if other processing, such as a processing A with HTTP protocol and a processing B with SMTP protocol are entered, these processing A, B gets preference so that the voice data packet P may not be set out at a desirable timing. This causes the delay of communication.

In a system implementing the present invention as shown in Fig. (b), for example, even during the period of executing a processing A with HTTP

protocol or a processing B with SMTP protocol, at a predetermined timing, such as at timing T1, the encoder reads a voice digital data, and then, between timing T1 and T2, a voice data packet is generated, and, at timing T2, the output portion 15 sends the voice data packet onto a communication line. An interval between timing T1 and succeeding timing T2 is equal to T, and an interval between timing T2 and timing T3 is also equal to T. Thus, in the embodiment of the present invention, even when there exists some processing to be executed other than the processing for sending voice data packets, the voice data packets are produced and sent out at predetermined constant intervals so that it is possible to prevent any delay in sending the voice data.

The timing control by means of the clock signal 4 is also adopted in the receiving side as well, and the decoder 23 reads a received data from the receiving side memory 22 at a predetermined constant interval T. Even when other processing is entered, the data reading is executed in preference to the other processings. Therefore, a voice conversation can be performed without any delay by the use of the terminal.

The transmitting side terminal and the receiving side terminal is independently shown In Fig.1, however, it is common that an actual terminal equipment is provided both with a transmitting portion corresponding to the transmitting side terminal 1 shown in Fig.1 and a receiving portion corresponding to the receiving side terminal 2. Further, the memory 13, the encoder 14 and the output portion 15 of the transmitting side terminal 1, and the memory 22 and the decoder 23 of the receiving side terminal 2 can be embodied for example in a CPU provided in a personal computer.

Fig. 5(a) and 5(b) show examples of applications of a voice data transmission system according to the present invention. In the example of Fig.5(a), personal computers PC are provided in both terminals. The personal computer PC has a program capable of processing a program under any protocol such as APP, RTP and other protocol. The personal computer PC is connected to the Internet through a router R which functions to read the information contained in the header portion of a data packet to be sent out and determines a route on a communication line. This connection allows a voice communication between personal computers. Fig. 5(b) shows a link between a personal computer and a conventional phone. The personal computer PC is connected from IP network through a gate way GW to a conventional phone line PSTN. This allows a communication between a personal computer and a conventional telephone.

Fig. 6 shows in the form of flow charts a program for controlling the CPU of a personal computer in the case where a personal computer is adopted as a terminal in implementation of the present invention. Fig. 6(a) is a flow chart showing a processing flow at a transmitting side. First, in Step S1, it is determined whether input voice digital data exists in the transmitting side memory. When it is determined that there is no input voice digital data in the transmitting side memory, the Step S1 is repeated.

When it is determined that there is an input voice digital data in the transmitting side memory, this voice digital data is read from the memory at Step 2. The read voice digital data is compressed and encoded at Step3 to form a voice data packet. The formed voice data packet is sent out onto a communication line at Step 4. This timing of the sending of the voice data

packet is referred as T. At Step S5, a lapsed time after the timing T is measured. In the step S6, When it is determined that this lapsed time reaches a predetermined time, for example, when 20 msec has passed after the timing T, the process returns to Step S1 to read voice digital data from the memory again, and each step from Step2 to Step6 is thereafter repeated. By this means, at the transmitting side, a voice digital packet is sent out onto a communication line at each predetermined constant time interval, for example 20 msec.

Fig. 6(b) shows a processing flow at a receiving side. First, at Step7, it is determined whether there is an input of a voice data packet in the receiving side memory. When it is determined that there is an input voice data packet in the receiving side memory, the process goes to Step S8 to read a voice data in that packet from the memory. This timing is referred as timing T. Then, at Step 9, the voice data in the packet read from the memory is decoded and this decoded voice data is converted into an analog signal at S10. Then, at Step 11, it is checked whether a predetermined time, for example 20 msec, identical to the predetermined time corresponding to the interval for sending out the voice data packet at the transmitting side has passed after the timing T at the receiving side. When it is determined that this predetermined time has passed, the process returns to Step7 and then each step from Step 8 to Step 11 is repeated. Through this processing, at the receiving side, the received data packet is read at a time interval identical to the transmitting interval of the voice data packet at the transmitting side.

All of or a part of the program for process flow shown in Figs. 6(a) and (b) can be stored in a record medium, such as a floppy disc. When a

personal computer is to be adopted as a terminal of the system in accordance with the present invention, the personal computer can be configured to achieve a desirable function by loading the program recorded in this recording medium. Further, a data of this program can be transmitted to other station through a network such as Internet by having it on a suitable carrier medium such as carrier wave. A terminal, such as a personal computer, receiving such program data via a network can be configured to act as a terminal of a transmission system according to the present invention by loading the program. Therefore, the present invention also aims at a recording medium, which records such a program, and a transmitting medium such as a signal for transmitting an information containing such program data by having it on a carrier wave. In addition, the present invention aims at a method for sending a program data in order to provide this program data onto a communication line.

CLAIMS

1. In a voice data transmission system for transmitting a voice data via a communication line, comprising a transmitting side terminal and a receiving side terminal which are linked together via a wired and/or wireless communication line, said transmitting side terminal including an encoder for sequentially receiving data from a sound collector to sequentially generate data packets each including a header portion and a data potion containing coded voice signals, and a voice signal output portion for sequentially sending out said data packets onto said communication line, said receiving side terminal including a receiving side memory for sequentially storing said data packets received from the communication line, a conversion portion for sequentially retrieving said packet data stored in said receiving side memory and decoding the voice signals to convert said voice signals into analog voice signals, and a regenerating portion for regenerating a voice message according to said decoded analog voice signals, characterized in that said voice signal output portion in said transmitting side terminal is adapted to sequentially send out said data packets onto the communication line at predetermined constant intervals, said conversion portion in said receiving side terminal is adapted to retrieve the received data packets from said receiving side memory at constant intervals identical to said predetermined constant intervals at which said voice signal output portion in said transmitting side terminal sends out said data packets.

2. A voice data transmission apparatus as defined in claim 1, wherein said predetermined constant interval is not larger than 60 msec.

3. A voice data transmission apparatus as defined in claim 1, wherein said predetermined constant interval is not larger than 20 msec.

4. A voice data transmission apparatus as defined in claim 1, wherein said voice signal output portion in said transmitting side terminal is configured to sequentially send out said data packet onto the communication line at said predetermined constant intervals by means of a timer control.

5. A voice data transmission apparatus as defined in claim 1, wherein said conversion portion in said receiving side terminal is configured to retrieve the received data packets from said receiving side memory at said constant intervals by means of a timer control.

6. A voice data transmission apparatus as defined in claim 1, wherein said transmitting side terminal further includes a transmitting side memory, said voice data from said sound collector being converted into a digital data by an analog/digital converter and then stored in a first memory area of said transmitting side memory, said encoder being adapted to directly read the digital data stored in said first area to generate a data packet from said digital data without having the read-out digital data stored in another memory area.

7. A voice data transmission apparatus as defined in claim 6, wherein said encoder is adapted to store coded voice signal in a second memory area of said transmitting side memory, and said voice signal output portion is adapted to directly read said coded voice signals stored in said second memory area to sequentially send out the read coded voice

signals onto said communication line without having them stored in other memory areas.

8. A terminal device of a voice data transmission system for transmitting a voice data by being connected to a wired and/or wireless communication line, said terminal device comprising a transmitting portion and a receiving portion,

said transmitting portion including an encoder for sequentially receiving input data from a sound collector to sequentially generate data packets each including a header portion and a data potion containing coded voice signals, and a voice signal output portion for sequentially sending out said data packets onto said communication line, said voice signal output portion being adapted to sequentially send out said data packets onto the communication line at predetermined constant intervals, said receiving portion including a receiving side memory for sequentially storing voice data containing data packets received from the communication line, a conversion portion for sequentially retrieving said packet data stored in said receiving side memory and decoding the voice signal to convert said voice signal into an analog voice signal, and a regenerating portion for regenerating a voice message according to said decoded analog voice signal, said conversion portion being adapted to retrieve the received data packets from said receiving side memory at constant time intervals identical to said predetermined constant intervals at which said voice signal output portion of said transmitting portion sends said data packets.

9. A terminal as defined in claim 8, wherein said voice signal output portion of said transmitting portion is configured to sequentially send out said data packets onto the communication line at the predetermined

constant intervals by means of a timer control.

10. A terminal as defined in claim 8, wherein said conversion portion of said receiving portion is configured to retrieve the received data packet from said receiving side memory at said constant interval by means of a timer control.

11. A voice data receiving device comprising a receiving side memory for sequentially storing data packets each including a voice data and received from a communication line, a conversion portion for sequentially retrieving data in said packet stored in said receiving side memory and decoding voice signals to convert said voice signals into analog voice signals, and a regenerating portion for regenerating a voice message according to said decoded analog voice signals, said conversion portion being adapted to retrieve the received data packet from said receiving side memory at a predetermined constant interval by means of a timer control.

12. A voice data transmission device comprising an analog/digital converter for converting voice data received from a sound collector, into digital data, a transmitting side memory for storing said digital data, and an encoder for sequentially retrieving said digital data from said transmitting side memory to sequentially generate data packets each including a header portion and a data potion including coded voice signals, and a voice signal output portion for sequentially sending out said data packets onto said communication line, said digital data being adapted to be stored a first memory area of said transmitting side memory, characterized by the fact that said encoder is adapted to directly read the digital data which is

stored in said first area to generate said data packets and stores said data packets containing coded voice signals into a second memory area, said voice signal output portion being adapted to directly read said data packets stored in said second area to send out said data packets onto the communication line.

13. A voice data sending apparatus as defined in claim 12, wherein said voice signal output portion is configured to send out said data packet onto the communication line at predetermined constant intervals by means of a timer control.

14. A method for transmitting a voice data comprising steps of converting analog voice data received from a sound collector into digital data, storing the converted digital data in a memory, retrieving and encoding the digital data stored in the memory, and sending out the encoded data onto a communication line at predetermined constant time intervals.

15. A method for receiving a voice data and regenerating a corresponding voice message, said method comprising steps of sequentially storing data packets, received from a communication line in a memory containing voice data, sequentially retrieving the data of said packet stored in said memory at a predetermined constant interval by means of a timer control in preference to other processing, decoding the voice signal, converting said voice signal into an analog voice signal, and regenerating a voice message according to said decoded analog voice signal.

16. A recording medium having a record of at least a part of a program data for controlling a processor of a computer to execute steps, repeatedly at predetermined constant intervals, of reading input voice digital data from a memory when such input voice digital data exists in said memory, encoding said read voice digital data to form voice data packets, and sending out said voice data packets onto a communication line.

17. A recording medium having a record of at least a part of a program data for controlling a processor of a computer to execute steps, repeatedly, of reading input voice data packets from a memory at predetermined constant intervals when such input voice data packets are received by said memory from the communication line, and decoding voice data in said data packets.

18. A recording medium having record of at least a part of a program data for controlling a processor of a computer to execute steps, repeatedly at predetermined constant time intervals, of reading input voice digital data from a memory when such input voice digital data exists in said memory, encoding said read voice digital data to form voice data packets and sending out said voice data packets onto a communication line, and for controlling the processor of said computer to execute steps repeatedly, of reading voice data packets from a memory at constant time intervals identical to said predetermined constant intervals when such input voice data packets are received by said memory from the communication line, and decoding the voice data in the packets.

19. A transmitting medium for transmitting an information containing at least a part of a program data for controlling a processor of a

computer to execute steps, repeatedly at predetermined constant time intervals, of reading input voice digital data from a memory when such input voice digital data exists in said memory, encoding said read voice digital data to form voice data packets, and sending out said voice data packets onto a communication line.

20. A transmitting medium for transmitting an information containing at least a part of a program data for controlling a processor of a computer to execute steps, repeatedly, of reading input voice data packets from a memory at predetermined constant time intervals when such input voice data packet is received by the memory from the communication line, and decoding the voice data in the packets.

21. A transmitting medium for transmitting an information containing at least a part of a program data for controlling a processor of a computer to execute steps repeatedly at predetermined constant time intervals, of reading input voice digital data from a memory when such input voice digital data exists in the memory, encoding said read voice digital data to form voice data packets, and sending out said voice data packets onto a communication line, and for controlling the processor of said computer to execute steps, repeatedly, of reading input voice data packets from a memory at constant time intervals identical to said predetermined constant intervals when such input voice data packets are received by the memory from the communication line and decoding the voice data in the packets.

22. A method for sending out a program data including steps of providing signals on a carrier wave to a communication line, said signals

representing at least a part of a program data for controlling a processor of a computer to execute steps, repeatedly, of reading input voice digital data from a memory when such input voice digital data exists in the memory, encoding said voice digital data to form voice data packets, and sending out said voice data packets onto a communication line.

23. A method for sending out a program data including steps of providing signals on a carrier wave to a communication line, said signals representing, at least a part of a program data for controlling a processor of a computer to execute steps, repeatedly, of reading input voice data packets from a memory at predetermined constant time intervals when such input voice data packets are received by the memory from the communication line, and decoding the voice data in the packets.

24. A method for sending out a program data, including steps of providing signals on a carrier wave to a communication line, said signals representing at least a part of a program data for controlling a processor of a computer to execute steps, repeatedly, of reading input voice digital data from a memory when such input voice digital data exists in the memory, encoding said voice digital data to form voice data packets, and sending out said voice data packets onto a communication line, and for controlling said processor of the computer to execute steps repeatedly, of reading input voice data packets from a memory at constant time intervals identical to said predetermined constant time intervals when such input voice data packets are received by the memory from the communication line, and decoding the voice data in the packets.

FIG. 1

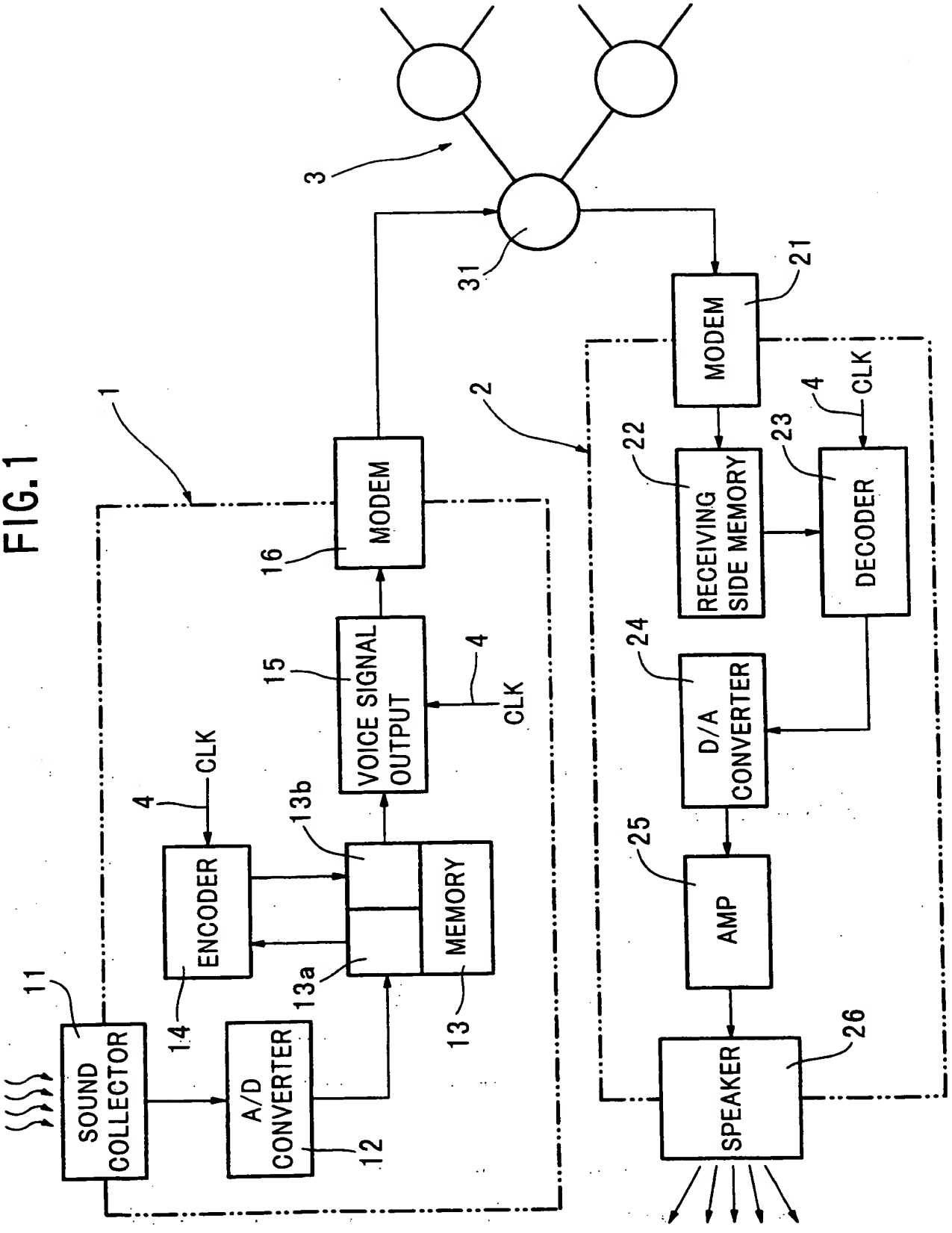


FIG. 2

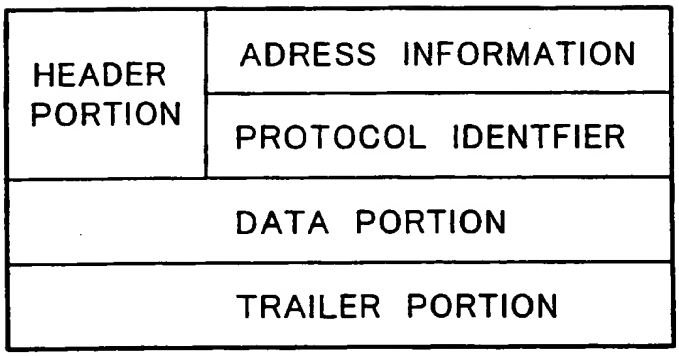


FIG. 3

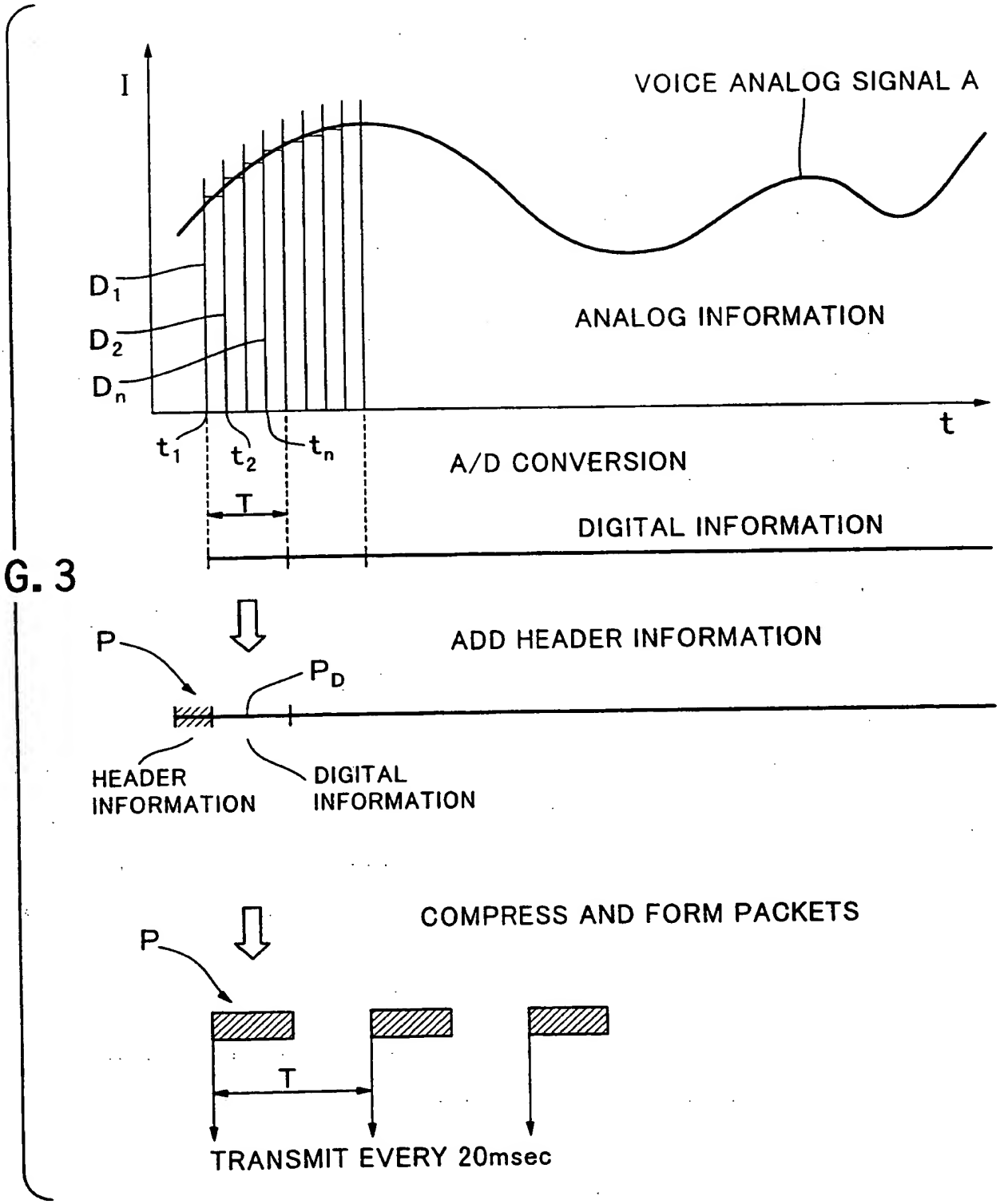


FIG. 4a
PRIOR ART

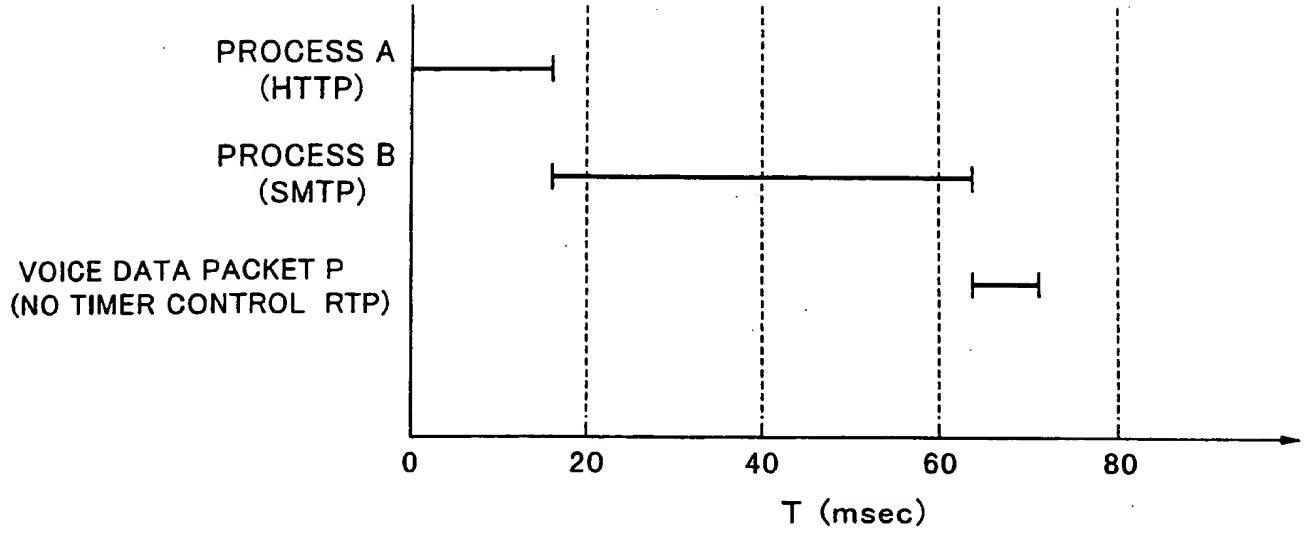


FIG. 4b
INVENTION

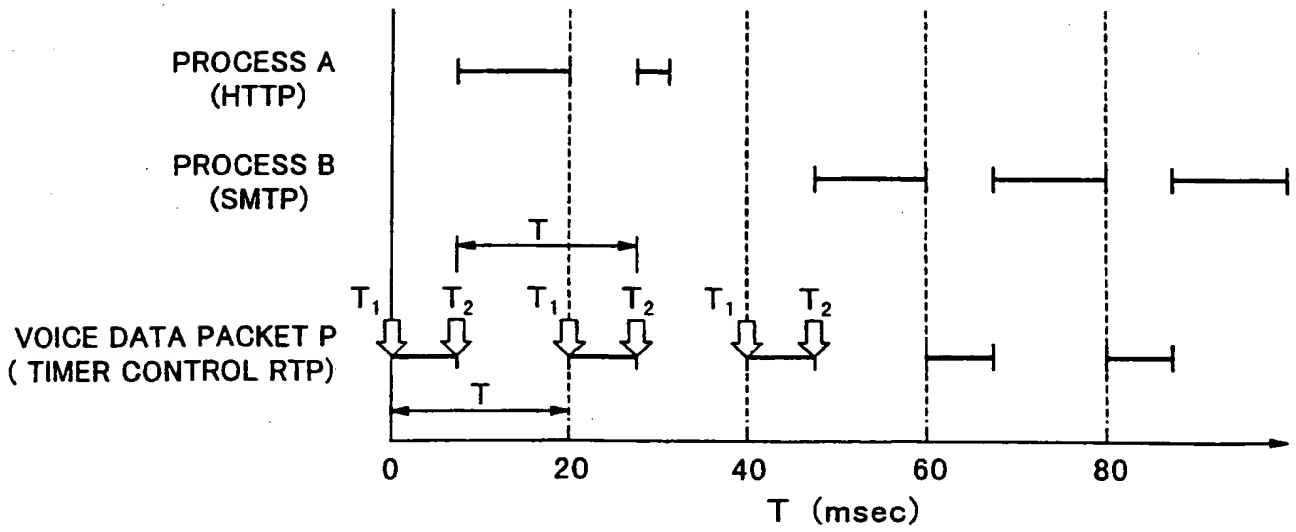


FIG. 5a

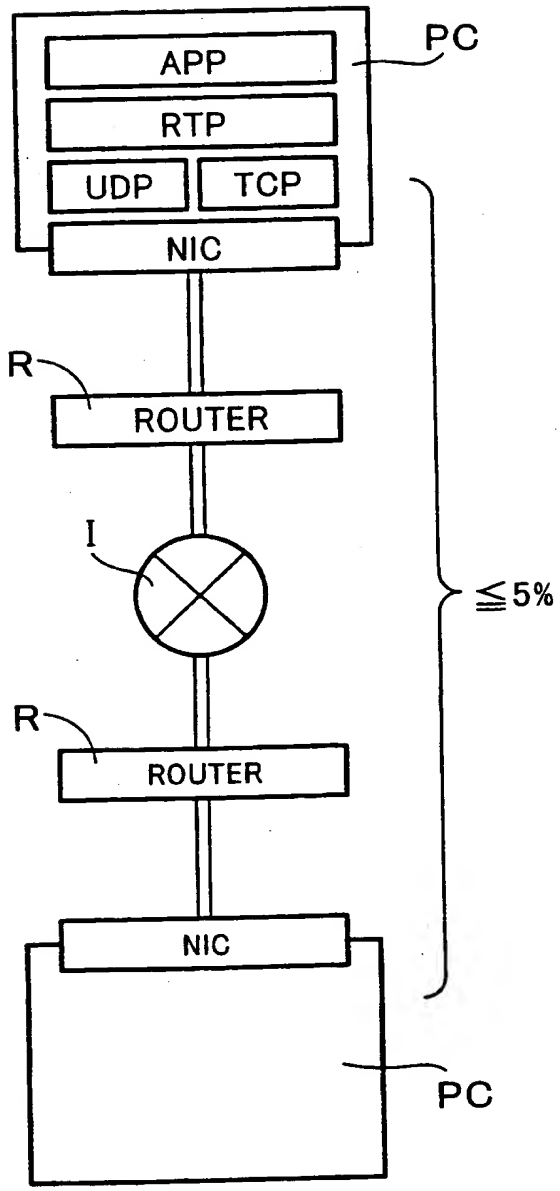


FIG. 5b

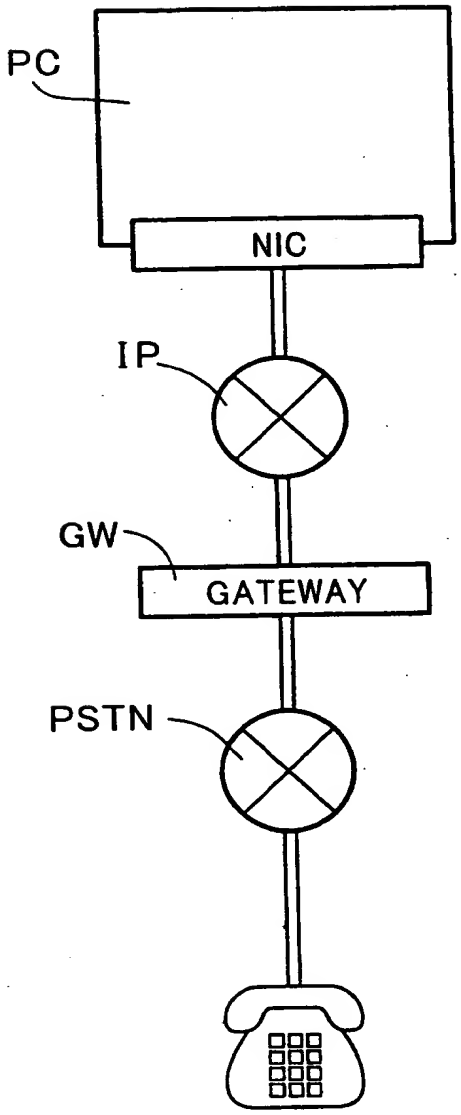


FIG. 6a

PROCESSING FLOW AT TRANSMITTING SIDE

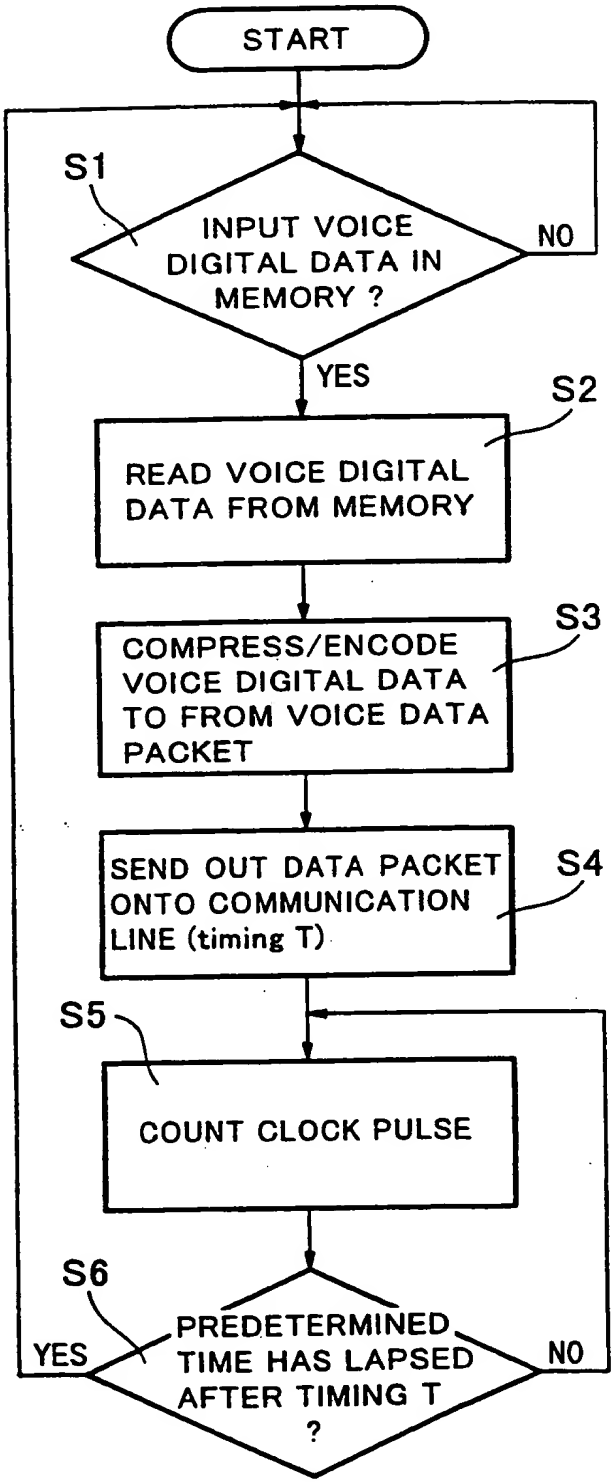
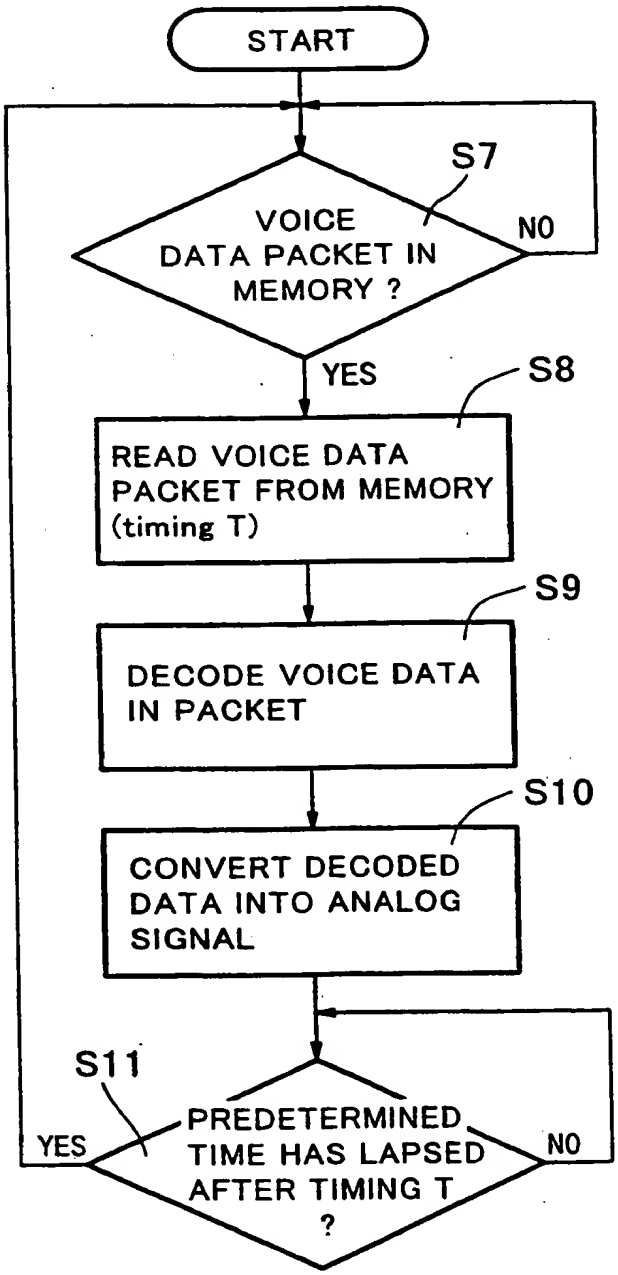


FIG. 6b

PROCESSING FLOW AT RECEIVING SIDE



INTERNATIONAL SEARCH REPORT

Interna l Application No
PCT/JP 00/02078

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04L12/64

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 669 749 A (MULTI TECH SYSTEMS INC) 30 August 1995 (1995-08-30) page 7, line 54 -page 8, line 13 page 19, line 26 -page 20, line 9 page 25, line 20 - line 27; figure 15	1-24
A	WO 97 38511 A (AT & T CORP) 16 October 1997 (1997-10-16) page 18, line 19 - line 24	2,3
A	US 5 668 738 A (ATARAS III WILLIAM S) 16 September 1997 (1997-09-16) column 6, line 59 - line 66	16-24

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
23 June 2000	30/06/2000

Name and mailing address of the ISA	Authorized officer
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1

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INTERNATIONAL SEARCH REPORT

Information on patent family members

Internat I Application No
PCT/JP 00/02078

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		JP 2846246 B	13-01-1999
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WO 9738511 A	16-10-1997	CA 2250789 A	16-10-1997
		EP 0894386 A	03-02-1999
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